

Historic, Archive Document

Do not assume content reflects current scientific knowledge, policies, or practices.

United States Department of Agriculture

DIVISION OF FOREST PATHOLOGY

Bureau of Plant Industry, Soils and Agricultural Engineering

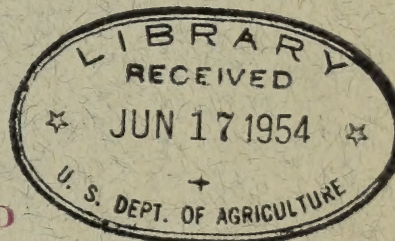
in cooperation with the
FOREST PRODUCTS LABORATORY
FOREST SERVICE
MADISON, WISCONSIN

Office Report

**SOIL TESTS ON PRESSURE-SENSITIVE ADHESIVE TAPES USING
SODIUM PENTACHLORPHENATE AND CREOSOTE AS PROTECTIVE COATINGS,**

By

Robert L. Krause, Assistant Pathologist



**RESTRICTED
CLASSIFIED DOCUMENT**

This document contains classified information affecting the National Defense of the United States within the meaning of the Espionage Act, USC 50:31 and 32. Its transmission or the revelation of its contents in any manner to an unauthorized person is prohibited by law. Information so classified may be imparted only to persons in the military and naval Services of the United States, appropriate civilian officers and employees of the Federal Government who have a legitimate interest therein, and to United States Citizens of known loyalty and discretion who of necessity must be informed thereof.

Declassified

Not for Publication

August 25, 1944

UNITED STATES
DEPARTMENT OF AGRICULTURE
LIBRARY



Reserve
BOOK NUMBER

871717

A309
P692

August 25, 1944

Office ReportSOIL TESTS ON PRESSURE-SENSITIVE ADHESIVE TAPES USING
SODIUM PENTACHLORPHENATE AND CREOSOTE AS PROTECTIVE COATINGS

Tape and Rubber	Description	Manufacturer
By		
Jenflex (3)	Plain cloth backing	Industrial Tape Corps
Robert L. Krause, Assistant Pathologist		
Wallitape (6)	Division of Forest Pathology	Bureau of Plant Industry, Soils, and Agricultural Engineering
Seamless Rubber	Plain cloth backing	The Seamless Rubber Co.
Blue Gray (12)	-----	
Masko 180 (14)	Resin-coated cloth	Van Giesel Bros.

Since several different coatings containing pentachlorophenol gave good protection to cloth-backed tapes buried in soil for 5 or 6 weeks ^{1/} it was thought worth while to try a 5-percent sodium pentachlorophenate dip on several plain cloth-backed tapes. Creosote was also tested as a protective coating since creosote is known to give good protection in soil. Adhesion tests were also made on creosote-coated tapes to determine its effect on adhesion because coatings containing oils have been found to reduce adhesion. ^{1/}

Seamless Rubber : Do. The Seamless Rubber Co.
Olive Drab (23) : Do.

SOIL BURIAL TESTSTreatment with Sodium Pentachlorophenate

One- by 8-inch strips of 8 different plain cloth-backed pressure-sensitive adhesive tapes (table 1) were applied to the fiberboard material which is used on the rim of the M5E1 land mine jacket. These strips were dipped in water acidified with phosphoric acid

^{1/} Krause, Robert L., Duncan, Catherine G., and Spinar, Frank J. Soil burial and mold tests on tapes, the fiberboard jacket, and the carrying strap for land mines. Office Report. Aug. 3, 1944.

August 22, 1944

Office Report

SOIL TESTS ON PRESSURE-SENSITIVE ADHESIVE TAPES USING
SODIUM PENTACHLOROPHOSPHATE AND CREOSOTE AS PROTECTIVE COATINGS

by

Robert L. Krause, Assistant Pathologist
Division of Forest Pathology
Bureau of Plant Industry, Soils, and Agricultural Engineering

Since several different coatings containing pentachlorophosphorus gave good protection to cloth-backed tapes buried in soil for 5 or 6 weeks, it was thought worthwhile to try a 5-percent sodium pentachlorophosphate dip on several plain cloth-backed tapes. Creosote was also tested as a protective coating since creosote is known to give good protection in soil. Adhesion tests were also made on creosote-coated tapes to determine its effect on adhesion because coatings containing oils have been found to reduce adhesion.

SOIL BURIAL TESTS

Treatment with Sodium Pentachlorophosphate

One by 8-inch strips of 8 different plain cloth-backed pressure-sensitive adhesive tapes (Table I) were applied to the fiberboard material which is used on the rim of the M&S land mine jacket. These strips were dipped in water acidified with phosphoric acid

1/ Krause, Robert L., Duncan, Katherine U., and Uhlman, Frank J.
Soil burial and mold tests on tapes, the fiberboard jacket, and
the carrying strap for land mines. Office Report, Aug. 2, 1944.

(pH 1.0 to 2.0) for Table 1. -- Tapes in test a 5-percent solution of sodium pentachlorophenate for the same length of time.

Previous studies ^{2/} on the effect of pH on the adsorption of sodium

Tape and number	Description	Manufacturer
Jonflex (8)	Plain cloth backing	Industrial Tape Corp.
Utilitape (4)	Resin-coated cloth backing	Do
Seamless Rubber	Plain cloth backing	The Seamless Rubber Co.
Blue Gray (12)		
Masko 180 (14)	Resin-coated cloth backing with Orsonol	Van Cleef Bros.
Bauer & Black (17)	Plain cloth backing	Bauer & Black
Bauer & Black (18)	Do.	Do.
Arno Yellow (19)	Do.	Arno Adhesive Tapes, Inc.
Parke-Davis (20)	Do.	Parke & Davis
Van Cleef (22)	Do.	Van Cleef Bros.
Red Ordnance (23)	Do.	The Seamless Rubber Co.
Olive Drab	Do.	

Specific gravity at 38° C. = 1.031
Coke residue = 0.45 percent
Distillation up to 210° C. = 0.55 percent
Distillation up to 255° C. = 1.25 percent
Distillation up to 270° C. = 18.50 percent
Distillation up to 315° C. = 41.50 percent
Distillation up to 335° C. = 75.50 percent
Residue above 355° C. = 23.50 percent

A brush treatment was applied over the backings of 3 plain cloth-backed tapes and 2 resin-coated cloth-backed tapes (table 1.)

After sufficient time for drying the treated tape strips were buried edgewise in soil so that the upper edge was just beneath the surface. Burial was in the same soil used in previous tests. ^{3/}

^{2/} Unpublished thesis by Robert L. Krause.

^{3/} See footnote 1, page 1.

Table 1. -- Tapes in test

Tape and Number	Description	Manufacturer
Jonflex (3)	Plain cloth backing	Industrial Tape Corp.
Uellitape (4)	Resin-coated cloth backing	Do
Seamless Rubber Blue Gray (12)	Plain cloth backing	The Seamless Rubber Co.
Manco 180 (14)	Resin-coated cloth backing	Van Giesel Bros.
Bauer & Black (17)	Plain cloth backing	Bauer & Black
Bauer & Black (18)	Do.	Do.
Airco Yellow (19)	Do.	Airco Adhesive Tapes, Inc.
Parker-Davis (20)	Do.	Parker & Davis
Van Giesel Red Ordnance (22)	Do.	Van Giesel Bros.
Seamless Rubber Olive Drab (23)	Do.	The Seamless Rubber Co.

(pH 1.0 to 2.0) for 1 to 2 minutes and then into a 5-percent solution of sodium pentachlorophenate for the same length of time. Previous studies ^{2/} on the effect of pH on the adsorption of sodium pentachlorophenate to wood pulp indicated that greater adsorption was obtained if the pulp suspension was first acidified to a pH of 4 or 5. Results of the work on pulp also seemed to indicate that the chemical adsorbed at pH 4 or 5 was held more tightly and was less subject to leaching.

These results indicate that the treatment with sodium pentachlorophenate provided satisfactory Treatment with Creosote tapes tested. This means

that Coal tar creosote having the following characteristics was obtained from the Division of Wood Preservation of the Forest Products Laboratory: 5 pounds, equalled the original wet tensile. Creosote gave

pH - 5.5 protection on all the tapes treated except Banks 180
 Specific gravity at 38° C. = 1.091
 Benzol insoluble - - - - - = 0.46 percent though creosote protected
 Coke residue - - - - - = 1.54 percent
 Water - - - - - = 0.3 percent length of this resin-coated
 Distillation up to 210° C. = 0.55 percent
 Distillation up to 235° C. = 1.25 percent does not protect resin-coated
 Distillation up to 270° C. = 18.50 percent
 Distillation up to 315° C. = 41.30 percent The latter tapes probably
 Distillation up to 355° C. = 75.90 percent
 Residue above 355° C. - - - = 23.30 percent the resin coating on tapes

A brush treatment was applied over the backings of 3 plain cloth-backed tapes and 2 resin-coated cloth-backed tapes (table 1.)

After sufficient time for drying the treated tape strips were buried edgewise in soil so that the upper edge was just beneath the surface. Burial was in the same soil used in previous tests. ^{3/}

^{2/} Unpublished thesis by Robert L. Krause.

^{3/} See footnote 1, page 1.

(pH 1.0 to 2.0) for 1 to 2 minutes and then into a 5-percent solution of sodium pentachlorophosphate for the same length of time. Previous studies³ on the effect of pH on the adsorption of sodium pentachlorophosphate to wood pulp indicated that greater adsorption was obtained if the pulp suspension was first acidified to a pH of 4 or 5. Results of the work on pulp also seemed to indicate that the chemical adsorbed at pH 4 or 5 was held more tightly and was less subject to leaching.

Treatment with Cresosote

Coal tar cresosote having the following characteristics was obtained from the Division of Wood Preservation of the Forest Products Laboratory:

Residue above 325° C.	-23.30 percent
Distillation up to 325° C.	278.90 percent
Distillation up to 315° C.	241.50 percent
Distillation up to 270° C.	18.80 percent
Distillation up to 235° C.	1.25 percent
Distillation up to 210° C.	0.55 percent
Water	-0.3 percent
Goke residue	-1.84 percent
Residue insoluble	-0.48 percent
Specific Gravity at 38° C.	1.031

A brush treatment was applied over the backing of 3 plain cloth-backed tapes and 2 resin-coated cloth-backed tapes (table I.). After sufficient time for drying the treated tape strips were buried edgewise in soil so that the upper edge was just beneath the surface. Burial was in the same soil used in previous tests.³

³ Unpublished thesis by Robert L. Kruse.

This soil had a pH ranging from 6.2 to 6.5 and a moisture content maintained between 22 and 28 percent. The average soil temperature was about 75° F. After 6 weeks' burial each strip was tested for wet tensile strength.

Results

The wet tensile strengths of the tapes are recorded in table 2.

These results indicate that the treatment with sodium pentachlorophenate provided satisfactory protection on all the tapes tested. This means that the treated tapes, after 6 weeks' burial, retained a minimum wet tensile strength of 35 pounds or, if the original wet tensile was less than 35 pounds, equaled the original wet tensile. Creosote gave satisfactory protection on all the tapes treated except Masko 180 (no. 14). This was a resin-coated tape. Although creosote protected Utilitape (4) satisfactorily, the tensile strength of this resin-coated tape also was reduced. Apparently creosote does not protect resin-coated tapes as readily as plain cloth-backed tapes. The latter tapes probably absorb the treatment more completely whereas the resin coating on tapes like Masko 180 and Utilitape probably prevent movement of the treating solution through the resin coatings so that the treatment is not absorbed by the cloth. The sodium pentachlorophenate dip was not tried on resin-coated tapes because of the probable impenetrability of the resin coating.

THE EFFECT OF CREOSOTE ON THE ADHESION OF

PRESSURE-SENSITIVE TAPES

Experience with coatings containing oil carriers (Toxic Sealite

THE UNIVERSITY OF CHICAGO

[illegible]

Approved for release by NSA on 08-28-2013 pursuant to E.O. 13526

Table 2. --Wet tensile strengths after 6 weeks' soil burial

of untreated tapes and tapes treated with 5 per-
cent sodium pentachlorophenate and with creosote

	Tensile strength - pounds per inch width					
	Orig-inal	Orig-inal	Orig-inal	Orig-inal	Orig-inal	Orig-inal
	dry	wet	dry	wet	dry	wet
					5% sodium pentachlorophenate	Creosote
Jonflex (3)	41	49	32	2	56	57
Utilitape (4)	48	46	5		--	39
Seamless Rubber	41	37	3		53	53
Blue Gray (12)						
Masko 180 (14)	36	34	19		--	31
Bauer & Black (17)	45	46	2		48	--
Bauer & Black (18)	39	43	12		43	--
Arno Yellow (19)	44	40	5		51	--
Parke-Davis (20)	42	43	5		55	--
Van Cleef Red	36	35	14		50	47
Ordinance (22)						
Seamless Rubber	47	46	4		60	--
Olive Drab (23)						

1/ After 6-hour soak.

2/ Each control figure is an average of at least 6 samples;
each treated figure is an average of 4 samples.

Table 2. — Mean monthly streamflow at various points in the Sacramento River system, California, 1901-1920.

The streamflow is given in cubic feet per second, and the precipitation in inches.

The streamflow is given in cubic feet per second, and the precipitation in inches.

Point	Precipitation	Streamflow											
		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
San Francisco	40.0	1,000	1,200	1,500	1,800	2,000	2,200	2,500	2,800	3,000	3,200	3,500	3,800
San Jose	35.0	900	1,100	1,400	1,700	1,900	2,100	2,400	2,700	2,900	3,100	3,400	3,700
San Diego	30.0	800	1,000	1,300	1,600	1,800	2,000	2,300	2,600	2,800	3,000	3,300	3,600
San Antonio	25.0	700	900	1,200	1,500	1,700	1,900	2,200	2,500	2,700	2,900	3,200	3,500
San Marcos	20.0	600	800	1,100	1,400	1,600	1,800	2,100	2,400	2,600	2,800	3,100	3,400
San Juan	15.0	500	700	1,000	1,300	1,500	1,700	2,000	2,300	2,500	2,700	3,000	3,300
San Luis	10.0	400	600	900	1,200	1,400	1,600	1,900	2,200	2,400	2,600	2,900	3,200
San Pedro	5.0	300	500	800	1,100	1,300	1,500	1,800	2,100	2,300	2,500	2,800	3,100
San Gabriel	0.0	200	400	700	1,000	1,200	1,400	1,700	2,000	2,200	2,400	2,700	3,000

1/ After 1910 only.

2/ Data missing from 1911 to 1919 at San Francisco, and from 1912 to 1919 at San Jose.

and Permatox A) indicated that such coatings cause a marked initial reduction in adhesion. In time, however, the adhesion of such coated tapes improved so that after 4 to 6 weeks it was better than the uncoated tapes. It therefore seemed advisable to determine what effect creosote may have on adhesion.

Procedure

One-by 7 inch strips of the Seamless Rubber Company's plain cloth-backed Blue-Gray Tape and of Van Cleef's plain cloth-backed red ordnance tape (table 1) were pasted onto 1-1/8 by 7-1/2 inch strips of the fiberboard material forming the rim of the jacket of the M5E1 land mine. These were brush-coated with the creosote previously described. Adhesion tests, conducted according to the procedure outlined in U. S. Army Specification 50-11-810, were run after 6 hours, 24 hours, 2, 4, and 6 weeks.

Results

The results are recorded in table 3.

These results show that creosote as a protective coating on plain cloth-backed tapes produced a marked initial reduction in adhesion. After 24 hours, however, the adhesion of the creosoted samples, was almost as good as that of the uncoated tapes. With additional time the adhesion of the coated tapes was better than that of the uncoated.

The creosote treatment caused the adhesive to become much softer and gummier and there was extensive adhesive transfer at each period of testing. Such initial reduction in adhesion and such

and (b) the fact that the material was not tested in the same manner as the material in the other tests. In this connection, the results of the tests are given in Table 1. It is noted that the material was not tested in the same manner as the material in the other tests. It is noted that the material was not tested in the same manner as the material in the other tests.

Results

The results of the tests are given in Table 1. It is noted that the material was not tested in the same manner as the material in the other tests. It is noted that the material was not tested in the same manner as the material in the other tests. It is noted that the material was not tested in the same manner as the material in the other tests.

Conclusions

The results are recorded in Table 1. These results show that the material was not tested in the same manner as the material in the other tests. It is noted that the material was not tested in the same manner as the material in the other tests. It is noted that the material was not tested in the same manner as the material in the other tests.

Table 3. --The adhesion of two cotton cloth-backed
pressure-sensitive adhesive tapes
coated with creosote

Time period	Adhesion - ounces per inch width			
	Seamless Rubber		Van Cleef	
	Blue Gray (12)		Red Ordnance (22)	
	Not Coated	Creosote coated	Not coated	Creosote coated
6 hours	45	$\frac{1}{2}$ 14.8	25	$\frac{1}{2}$ 9
24 hours	44	$\frac{1}{2}$ 40.0	26	$\frac{1}{2}$ 23
2 weeks	--	$\frac{1}{2}$ 65	--	$\frac{1}{2}$ 58
4 weeks	72	$\frac{1}{2}$ 81	34	$\frac{1}{2}$ 66
6 weeks	84	$\frac{1}{2}$ 92	48	$\frac{1}{2}$ 76

1/ Extensive adhesive transfer.

TABLE 1. — RELATIONSHIP BETWEEN THE RATE OF GROWTH AND THE PERCENTAGE OF NITROGEN IN THE DIET

Experimental conditions

Experimental conditions

Rate of growth (g/g dry weight)		Percentage of nitrogen in the diet		Rate of growth (g/g dry weight)
Mean	Standard deviation	Mean	Standard deviation	
1.0	0.1	1.0	0.1	1.0
1.5	0.2	1.5	0.2	1.5
2.0	0.3	2.0	0.3	2.0
2.5	0.4	2.5	0.4	2.5
3.0	0.5	3.0	0.5	3.0
3.5	0.6	3.5	0.6	3.5
4.0	0.7	4.0	0.7	4.0
4.5	0.8	4.5	0.8	4.5
5.0	0.9	5.0	0.9	5.0
5.5	1.0	5.5	1.0	5.5
6.0	1.1	6.0	1.1	6.0
6.5	1.2	6.5	1.2	6.5
7.0	1.3	7.0	1.3	7.0
7.5	1.4	7.5	1.4	7.5
8.0	1.5	8.0	1.5	8.0
8.5	1.6	8.5	1.6	8.5
9.0	1.7	9.0	1.7	9.0
9.5	1.8	9.5	1.8	9.5
10.0	1.9	10.0	1.9	10.0

Experimental conditions

adhesive transfer may limit the usefulness of creosote as a protective coating on tapes.

CONCLUSIONS

Treatment of plain cloth-backed tapes with a 5-percent dip of sodium pentachlorophenate after an initial acid dip appears to give adequate protection for at least 5 weeks' burial in a biologically active soil.

Since studies on pulp indicated that sodium pentachlorophenate was absorbed more readily in acid solutions, treatment of fabrics with sodium pentachlorophenate may be more effective if the fabric is first given an acid treatment. In the commercial treatment of pulp and fabrics with sodium pentachlorophenate the solution often is acidified after the addition of the sodium pentachlorophenate. This practice brings about the precipitation of the insoluble pentachlorophenol which is then supposed to be absorbed onto the pulp or fabric. This practice may precipitate the insoluble pentachlorophenol from the soluble sodium salt, but it may not give very good adsorption to the material being treated. The insoluble pentachlorophenol may be precipitated in the water solution and only a small proportion be precipitated directly on the fiber. On the other hand, acidification of the fibrous material previous to treatment with sodium pentachlorophenate may bring about a more complete precipitation of the insoluble pentachlorophenol directly on the fiber.

The acid treatment should probably be limited in strength and the sodium pentachlorophenate applied immediately afterward to avoid damage

... a la manera de un libro que se va leyendo...

These findings are being reviewed by the National Commission on the Status of Women and the National Commission on the Causes and Prevention of Violence. The Commission on the Status of Women is currently conducting a study of the role of women in society and the Commission on the Causes and Prevention of Violence is currently conducting a study of the causes and prevention of violence. The results of these studies will be used to develop policies and programs to improve the status of women and to prevent violence.

to the fiber from the acid. An acid solution less strong than the one used would probably be sufficient to give the effect desired.

Creosote provided satisfactory protection for plain cloth-backed tapes, but it did not seem to work satisfactorily on resin-coated tapes.

Creosote as a coating on plain cloth-backed tapes caused a marked initial reduction in adhesion. However, the adhesion of the coated tapes improved with time so that after 2 weeks it was better than the uncoated tapes.

to the fiber from the acid. An acid solution less strong than the one used would probably be sufficient to give the effect desired.

Cresosote provided satisfactory protection for plain cloth-backed tapes, but it did not seem to work satisfactorily on resin-coated tapes.

Cresosote as a coating on plain cloth-backed tapes caused a marked initial reduction in adhesion. However, the a decrease of the coated tapes improved with time so that after 2 weeks it was better than the uncoated tapes.

